

AMENDMENTS TO THE CLAIMS:

The listing of claims below will replace all prior versions and listings of claims in the application:

Listing of Claims:

CLAIMS

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1. (Original) A method for fine frequency-offset error determination in a radio receiver, comprising the steps of:
    - sampling an OFDM radio transmission;
    - assuming a coarse frequency offset after compensation by a previous circuit that will not exceed approximately  $\pm 10$  kHz; and
    - using a cost function to determine a fine-frequency offset of said OFDM radio transmission for use in a subsequent circuit providing for frequency compensation of any fine-frequency offset.
  2. (Original) The method of Claim 1, further comprising the step of:
    - determining a coarse frequency offset of said OFDM radio transmission.
  3. (Original) The method of Claim 1, further comprising the step of:
    - compensating any coarse frequency offset determined in a previous step to at worst approximately  $\pm 10$  kHz.

4. (Currently Amended) The method of Claim 1, further comprising the step of:

finding a timing reference boundary between a short preamble and ~~said~~  
long preamble in said OFDM radio transmission.

5. (Original) The method of Claim 1, wherein the step of using a cost function generally conforms to

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$$C(\hat{v}) = |V_0 X_{\hat{v}}|^2 = \left| \sum_{n=0}^{63} x(n) e^{-j2\pi \frac{\hat{v}}{F_s} n} \right|^2$$

6. (Currently Amended) The method of Claim 1, wherein the step of sampling is such that ~~[said]~~<sub>a</sub> signal subspace is spanned by a set of 52 row vectors derived from a 64x64 square matrix associated with a 64-element discrete Fourier transform wherein ~~[said]~~<sub>a</sub> non-signal subspace is spanned by a set of 12 row vectors also derived from the 64x64 square matrix associated with the 64-element discrete Fourier transform and wherein two of these vectors are real[.,].

7. (Currently Amended) The method of Claim 1, wherein the step of sampling is such said OFDM radio transmission is typically measured in 16-bit I/Q samples every 0.05  $\mu$ S, and overall can be mathematically modeled as,

$$x(n) = A(n)e^{j\Phi(n) + j2\pi\frac{v}{F_s}n + j\varphi} + \eta(n)$$

where,

$\Phi(n)$ : long preamble phase

$v$ : residual frequency offset

$\varphi$ : phase offset

$\eta(n)$ : additive white Gaussian noise (AWGN).

8. (Currently Amended) A method for fine frequency-offset error determination in a radio receiver, comprising the steps of:

sampling an OFDM radio transmission, wherein fifty-two non-zero equal magnitude subcarrier measurements are obtained that collectively represent a reference signal comprising a signal subspace and a non-signal subspace, and is such said OFDM radio transmission is typically measured in 16-bit I/Q samples every 0.05  $\mu$ S, and overall can be mathematically modeled as,

$$x(n) = A(n)e^{j\Phi(n) + j2\pi\frac{v}{F_s}n + j\varphi} + \eta(n)$$

where,

$\Phi(n)$ : long preamble phase

$v$ : residual frequency offset

$\varphi$ : phase offset [;]  
 $\eta(n)$ : additive white Gaussian noise (AWGN);

determining a coarse frequency offset of said OFDM radio transmission;

compensating any coarse frequency offset determined in a previous step to at worst approximately  $\pm 10$  kHz;

finding a timing reference boundary between a short preamble and said long preamble in said OFDM radio transmission;

assuming a coarse frequency offset after compensation by a previous circuit will not exceed approximately  $\pm 10$  kHz; and

using a cost function to determine a fine-frequency offset of said OFDM radio transmission for use in a subsequent circuit providing for frequency compensation of any fine-frequency offset, wherein said cost function generally conforms to

Cost  
A!

$$C(\hat{\nu}) = |V_0 X_{\hat{\nu}}|^2 = \left| \sum_{n=0}^{63} x(n) e^{-j2\pi \frac{\hat{\nu}}{F_s} n} \right|^2 .$$

9. (Currently Amended) The method of Claim [1]8, wherein the step of sampling is such that [said]a signal subspace is spanned by a set of 52 row vectors derived from the 64x64 square matrix associated with the 64-element discrete Fourier transform wherein [said]a non-signal subspace is spanned by a set of 12 row vectors also derived from the 64x64 square matrix associated with the 64-element discrete Fourier transform and wherein two of these vectors are real[,].